

Jan. 18, 1966

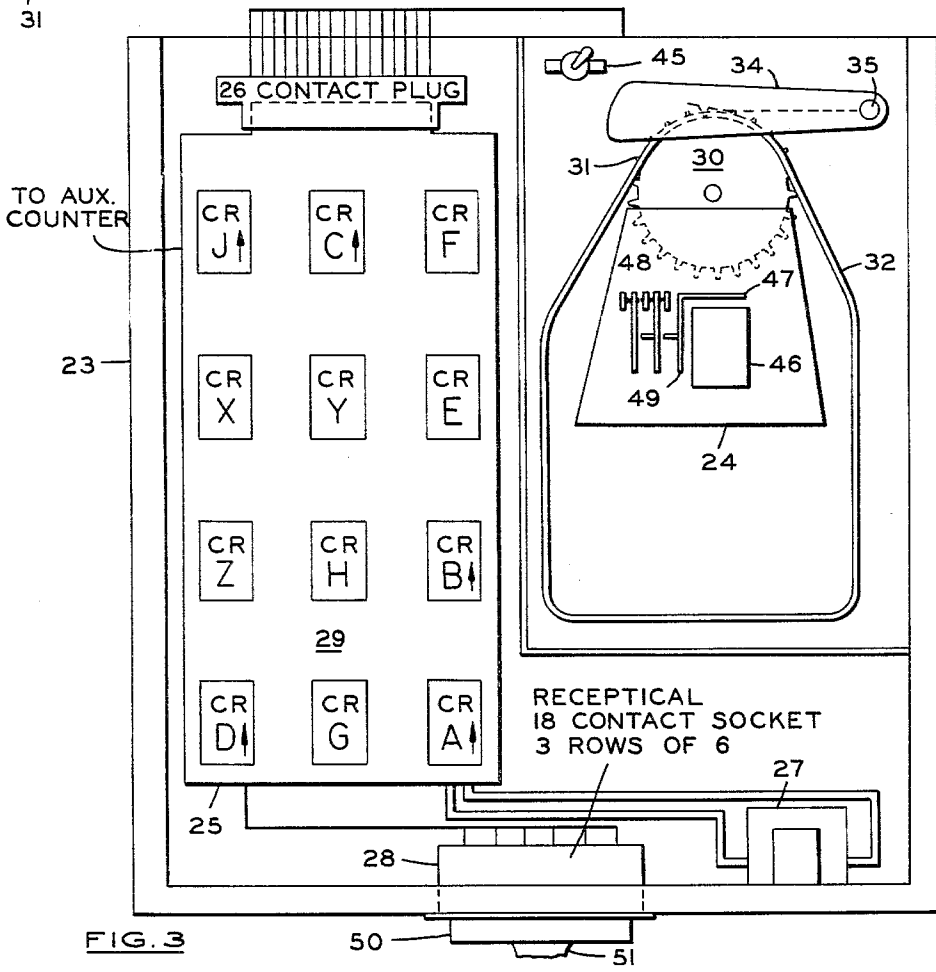
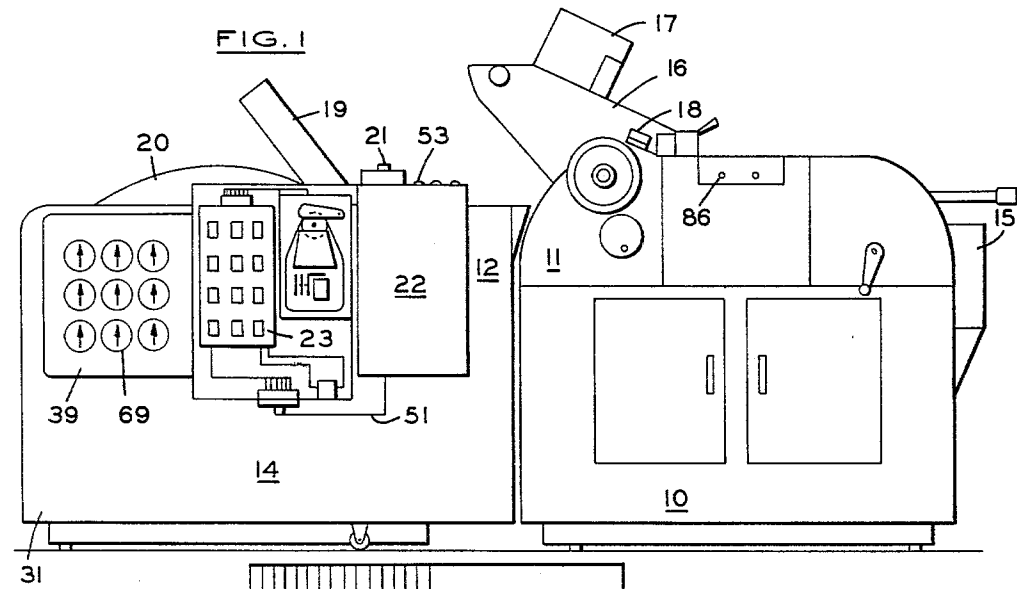
R. G. LOWE

3,229,599

MASS SHEET INSCRIBING, COUNTING, COLLATING, AND
STACKING MACHINE MEANS AND PROCESS

Filed Nov. 12, 1964

4 Sheets-Sheet 1



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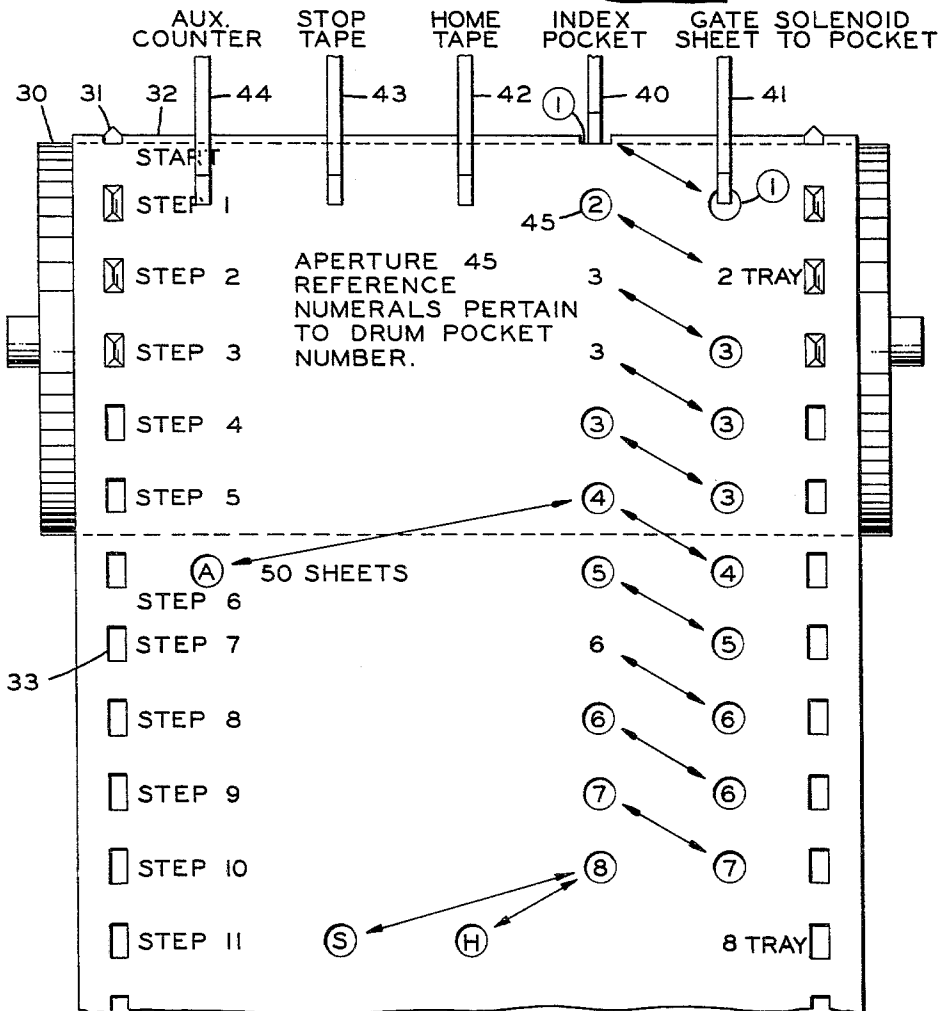
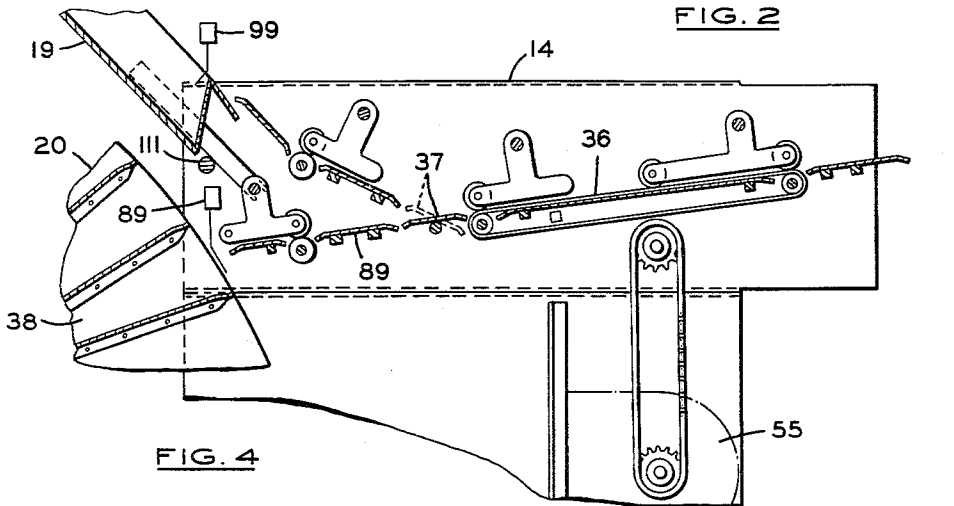
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4 Sheets-Sheet 2



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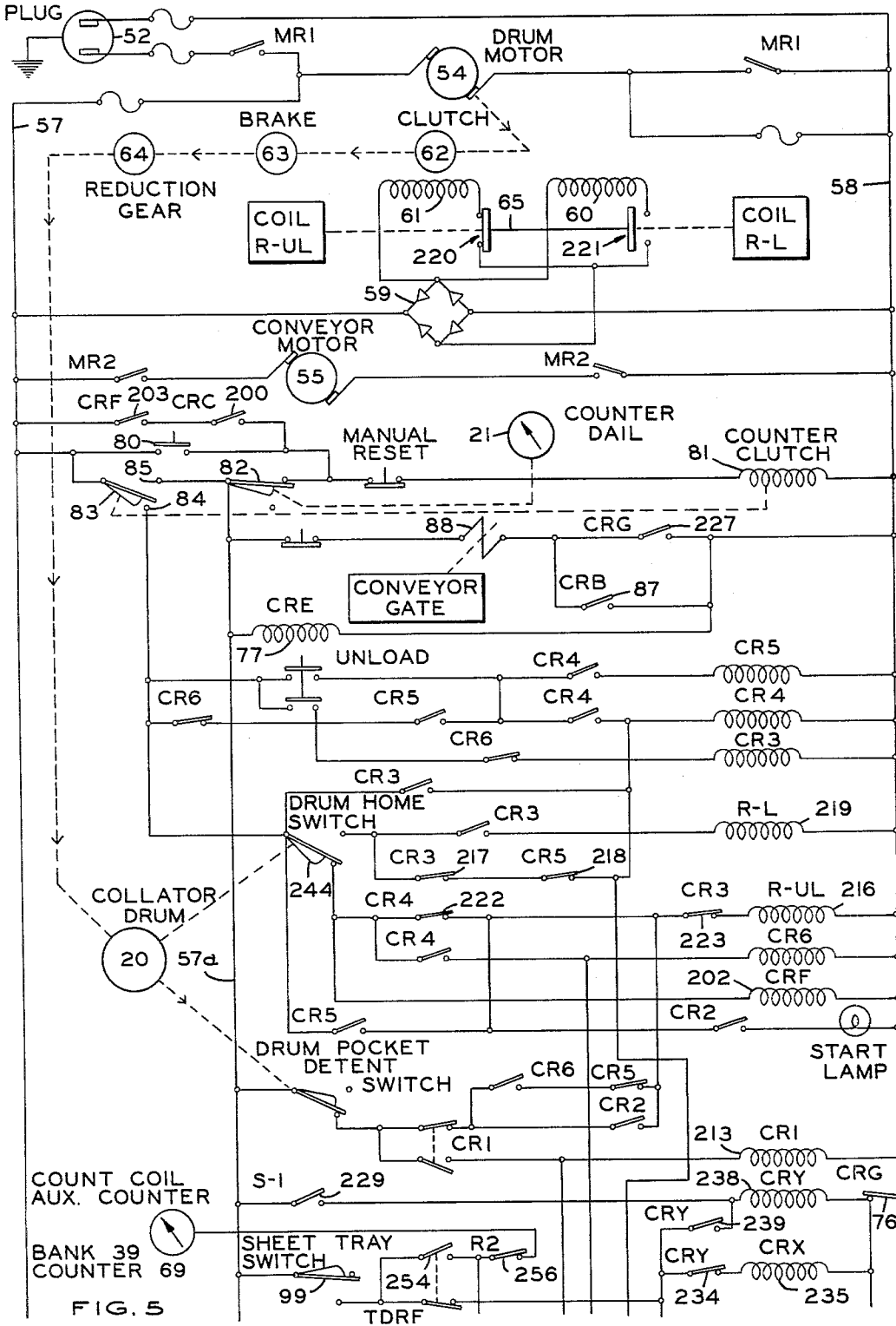
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Filed Nov. 12, 1964

4 Sheets-Sheet 3



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MASS SHEET INSCRIBING, COUNTING, COLLATING, AND STACKING MACHINE MEANS AND PROCESS

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Filed Nov. 12, 1964, Ser. No. 410,632

13 Claims. (Cl. 93—93)

This invention relates to a novel combination of automatic means and a novel process of printing or feeding a large quantity of paper sheets and distributing a desired number of the sheets in separate stacks in identified pockets assigned to certain recipients of a group of recipients, including zero sheets, one sheet, or any number of sheets to each recipient selectively so that each pocket contains the correct number of sheets for each certain designated recipient.

The novel combination and process of the invention provides efficient means and efficient processing of mass distribution of inscribed sheets such as printed paper communications in business, industry, and government. These communications may be letters, orders, manifests, directives, bills of lading, authorizations, schedules, books, reports, shipping notices, booklets, lists, etc. These few categories of printed sheets are stated by way of example as the various categories of mass printed and distributed sheets are too numerous to set forth completely.

Thus it will be understood that the invention relates to the mass distribution portion of paper work communication where there are groups of recipients receiving a copy or a specific number of copies of the same communication or communications. This may be on a more or less regularly scheduled basis.

The group of recipients or users for any one certain communication is established by the entity of an organization issuing the communication based on the necessities, advisability, and directives of the situation. Every entity of each organization issues several such communications to provide various groups of recipients or users with information necessary to coordinate the operation of all the entities within the organization and outside the organization. This enables the organization to operate efficiently with all its entities assisting and cooperating with one another rather than conflicting with one another or operating as an isolated individual section.

In an organization there are many mass distributed printed communications sent to many groups of recipients. In the operation of the organization the communications themselves and the groups to whom they are sent become and are more or less established. The time of issuance of each communication and its recipients is scheduled. There may be many daily, weekly, monthly, etc. communications. The various communications are known, their time and incidence of issuance is set, and their recipients are designated including the number of copies of each communication to be sent to each recipient.

These communications may be issued by the head office, subordinate officers, divisions, departments, and sections, and by the various local and remote sub-divisions, sub-departments, and sub-sections of each. The communications issued by each entity are sent to the others. By this means the past operation, the present operation, and the intended future operation of each entity is known by all the other affected entities so that an affected entity may operate presently and also plan its future operation relative to the other entities to enable the organization to operate smoothly as a whole. This is by way of example as the devices and system may be used for any purpose, such as advertising, parts and service list distribution, and any other use or purpose.

In the invention automatic printing means or other sheet feeding means, sheet conveying means, collator ma-

chine individual pocketing means, and selective control programming means are provided. The printing or feeding means supplies the desired quantity of sheets one at a time. The conveying means conveys each sheet to the collating machine pocketing means. The control programming means selectively controls depositing zero sheets, one sheet, or any desired number of sheets in each pocket. Each pocket is designated for a certain recipient or use by number corresponding to the number of the recipient or use on the distribution schedule for the mass distributed sheet communication.

The sheet feeding means may include printing means and this may be any type of automatic printing machine such as a Multigraph, Mimeograph, offset press, a letterpress, etc. A Multigraph machine is employed herein as a suitable example of a sheet feeding means and/or printing means. The machine may be set up to print the desired number of copies of a certain communication and stop. However, in the combination of the invention the programming means controls this automatically.

The conveying means may be any type conveyor, and the sorting machine or collator machine may be a collator such as a Multigraph or Accra-Feed Rotary Sorter or Collator. The Multigraph Rotary Sorter or Collator machine is employed herein as a suitable example. The collating machine may have a drum with a plurality of pockets, such as fifty or one hundred, which pass the conveyor means and dwell at the conveyor means a sufficient controlled time or operational period to receive the desired number of copies of the printed sheet communication. United States Patents No. 3,076,647 and No. 2,922,640 for collating machines show and describe suitable conveying and pocketing means.

The controller means may be any type which includes selective programming and means operated according to the program which open and close electric circuits selectively to effect operation of the printer, feeder, conveyor, and collating or stacking machines on program. A key-punched tape is shown and described as a suitable example in conjunction with tape step advancing, holding, and reading means. The tape is key-punched according to the scheduled distribution pattern to recipients or users of the communication or paper being distributed. Thus there may be a certain key-punch tape for the scheduled distribution of each communication. Also where a plurality of communications have the same schedule distribution, the same tape may be employed and may be regarded as a tape incorporating a master program or distribution schedule.

The novel combination of automatic machines and automatic controls may be used by each entity of an organization at the central location or may be used by one or more entities at certain locations as the high speed of operation enables multiple use by various branches of an organization having access to the facility. However, the combination and process of the invention is economically commercial for use by a single entity because of its efficiency.

Briefly summarizing the novel process, the distribution schedules are made up, the control tapes key-punched in programs according to the schedules, the recipients on the schedules numbered according to the drum pockets designated number sequence, the stencils cut with the communication of the schedule. These items are then given to the operator. The operator then places the programmed control tape on the control mechanism, places the stencil on the printing machine and runs the machines. With the invention, this immediately results in properly counted scheduled distribution properly designated to recipients instead of a stack of printed sheets then requiring counting and recipient distribution.

In the operation of the mechanism combination and the process of the invention, the pockets of the collating machine are designated with numbers such as 1 to 50 or 1 to 100 depending on the number of pockets. The distribution schedule for each communication lists the recipients and identifies them by number. The number on the distribution schedule corresponds to the number on the pocket. Thus each numbered recipient on the distribution schedule has a definite pocket in the collating machine identified by the number.

The distribution schedule also designates how many copies of the communication each recipient is to receive. This includes no copy, one copy, or any number of copies. The "no copy" designation is important and is included because most distribution schedules are made up relative to a master distribution schedule. This provides the sender with facility to modify the master distributions schedule to suit the necessities of various communications in that the sender may omit various recipients in a modified master schedule or program.

The particular distribution schedule for a certain communication is programmed on a key-punched control tape. The tape controls the position and dwell of each pocket of the collating machine relative to the conveyor moving sheets from the printing machine to the collating machine. The collating machine has a pocketed drum. The drum moves incrementally to locate each pocket at the conveyor to receive a sheet or sheets therefrom. The tape controls the drum dwell and incremental movement so that the tape may hold the drum with any pocket selectively at the conveyor until any desired number of sheets are deposited in the pocket.

After one pocket receives the desired number of sheets, the next pocket is advanced to the conveyor. At this pocket the tape may be key-punched "no copy" and the tape then actuates a gate in the conveyor diverting the sheet from the pocket to a collecting means such as a tray. Then the tape causes the drum to move the next pocket into receiving position at the conveyor. The tape thus controls each pocket of the drum relative to the delivery station or point of the conveyor and the number of sheets inserted in each pocket.

The tape also has a distribution schedule termination key-punch which sends the drum to its home position when the distribution schedule has fewer recipients than the number of drum pockets. The tape also has machine "shut down" key-punched information to terminate collating machine, printing machine, and controller operation upon the sheets being printed and sorted into stacks in the pockets according to the distribution schedule. The foregoing is described more fully hereinafter as to structure and operation.

From the foregoing it will be understood that a distribution schedule having fifty recipients receiving various numbers of copies, that more than fifty copies must be printed or fed. For example, a distribution schedule may designate the following:

Recipient Identified Pocket Number on Schedule	No. of Copies to Recipients	No. of Recipients Receiving Same No. of Copies	Required Copies
2-10-25-27-28-29-43-44	8	8	64
3-18-26-30	7	4	28
1-11-21-31-32-45-46	6	7	42
4-17-20-33-34-47	5	6	30
6-12-19	4	3	12
5-16-24-25-48	3	5	15
7-15-23-36-37-38-39-49-50	2	9	18
8-14-40	1	3	3
9-13-22-41-42	0	5	15
Total		50	217

¹ To tray.

In this example 217 copies must be fed. Normally the printing machine is set up, such as by a counter controlling its printing operation, to print 217 copies and shut

down. However, with the combination of the invention, the programmer controls this as hereinafter set forth. The collating machine drum is at the home position ready to receive sheets in the #1 pocket. The tape is previously key-punched incorporating the distribution program. An example is shown in part as follows:

Pocket Number	Number of Copies	Recipient
One	6	Engineering Dept.
Two	8	Accounting Dept.
Three	7	Mfg. Plant A.
Four	5	Mfg. Plant B.
Five	3	Traffic Dept.
Six	4	Purchasing Dept.
Seven	2	Mfg. Plant C.
Eight	1	Research Division.
Nine	0	Insurance Dept.
Ten	8	Sales Dept.
Eleven	6	Parts Dept.
Twelve	4	Assembly Plant A.
Thirteen	0	Personnel Dept.
Fourteen	1	Assembly Plant B.
Fifteen	2	Assembly Plant C.
Etc.		

As each printed sheet is fed from the printing machine it is picked up by the conveyor. On the conveyor it passes and actuates one of two switches in the conveyor effecting a signal to the program controller to advance the tape one incremental step. The tape is then read by the program control mechanism. With the foregoing schedule the tape is advanced five increments and reads "hold pocket" relative to number one pocket. This inserts five sheets in one pocket. On the sixth increment of the tape, the tape read "advance pocket" and this inserts the sixth sheet in the number one pocket and a signal is communicated to the drum drive mechanism and the drum is advanced a pocket to the number two pocket at the conveyor. Similarly, eight sheets are inserted in the number two pocket, seven sheets in the number three pocket, five sheets in the number four pocket until the program of the distribution schedule is completed. The speed of the operation is about two sheets per second so that with 217 copies, the machines will print, sort and pocket the entire distribution schedule in 74 seconds, or one minute and fourteen seconds.

With the Multilith printing machine of the exemplary embodiment, quick change printing stencils are employed, so that upon the printing machine shutting down, the used stencil is removed and the new stencil placed in position and pre-run a few sheets to insure correct printing. The printing machine is now ready for the next run.

In this connection, the entity of the organization issuing the mass communication to the recipients also types or cuts the stencil and supplies or designates the key-punched control tape to the operator together with the names and addresses of the recipients according to the number corresponding to the pocket numbers and program.

When several "master distribution schedule" program runs are to be made, the operator leaves the sheets in the drum pockets until all are completed. In this way he saves time in removing the sheets from the drum pockets. However, when a single or multiple run is completed, the operator removes the sheets from each pocket of the drum and inserts them in envelopes or mailing bags previously correspondingly addressed and numbered according to the distribution schedule.

From the foregoing it will be understood that the machine combination and process of the invention may be readily incorporated into the operation of an organization and its entities so that each entity and the organization as a whole may use the machines and process.

Government organizations such as the departments headed by Cabinet officers like the State, Treasury, Commerce, Labor, and Defense Departments including the Army, Navy, and Air Force including S.A.C. each send out thousands of such mass distributed communications each year. Commercial organizations such as banks, in-

insurance companies, railroads, air lines, steamship, telephone companies, etc. also send out thousands of such mass distributed communications each year. Industrial and sales organizations such as United States Steel, General Motors, Ford, General Electric, Champion Spark Plug, Westinghouse, Procter & Gamble, Lever Bros., General Foods, Armour, etc. also send out thousands of such mass distributed communications each year. Thus the magnitude and the complexity of the mass distributed printed communication problem can be appreciated to some degree and it is submitted that it can hardly be overestimated by the stated approximations as they are considered close to minimum.

With the foregoing in view it is an object of the invention to provide a novel combination of machine means for and a novel process of printing, feeding, sorting, counting, and designating mass distributed printed communications according to schedules automatically.

An object of the invention is to provide a combination of machines and a process for automatically handling mass distribution communications which is fast, efficient, accurate, labor saving, time saving, space saving, durable, dependable, and operable by a person who need not be highly skilled.

An object of the invention is to provide an automatic printing and/or feeding machine coupled with an automatic collating and pocketing machine for printing and pocketing the printed sheets in identified stacks according to the numbered pocket designations of a distribution schedule.

An object of the invention is to provide means and a process for effecting immediate controlled distribution of mass communications which eliminates the delay heretofore encountered between printing, feeding and collating into stacks.

An object of the invention is to provide means and a process for distributing mass communication which is mechanically accurate thereby eliminating the human errors encountered with people counting and sorting.

An object of the invention is to provide operating means for the sorting and pocketing machine capable of operating the machine so that any number of copies of a printed communication may be selectively inserted in any certain pocket including zero copies.

An object of the invention is to provide selective program control means such as reading mechanism and a key-punched tape cooperating to control the operating means of the sorting and pocketing machine to selectively control the number of copies of the printed communication inserted in each pocket of the machine according to a program corresponding to the distribution schedule.

An object of the invention is to provide "homing" circuits in the operating means, the program control means, and the tape so that in distribution schedules having fewer recipients than the number of drum pockets of the collating machine, upon the schedule being completed, the distribution is terminated and the drum and tape sent to the home position by-passing the remaining unused pockets to facilitate the use of smaller size schedules with a machine having a large capacity by saving operating time and limiting the operation time of the machine to the size of the schedule and so that the equipment is ready for the next operation.

An object of the invention is to provide a switch gate in the conveyor between the printing machine and the collating machine which is capable of directing sheets to any pocket or away from any pocket of the drum to provide for passing a pocket in the drum past the loading station without having a sheet inserted in the pocket thereby facilitating including zero sheets in the distribution schedule.

An object of the invention is to provide program means including a tape having the punched information and means controlling the switch gate activated by the program control means reading the tape to operate the

switch gate between its position inserting a sheet in a drum pocket and its position not inserting a sheet in a drum pocket according to the distribution intelligence key-punched in the tape.

5 An object of the invention is to provide one or more auxiliary counters in combination with the machines and with the programmer for controlling the insertion of large and/or variable numbers of sheets in any pocket on signal from the programmer at various points in the schedule or program.

10 An object of the invention is to provide auxiliary counters in the program to provide a selectable variable relative to any program of a program tape at any certain point.

15 An object of the invention is to provide at least one auxiliary counter in the program so that the pocketing of large numbers of sheets in one or more pockets may be eliminated as a large number of steps in the tape and rather have only a single step in the tape activating the auxiliary counter at a point in the program.

20 These and other objects of the invention will become apparent by reference to the following description of a printing, sorting, and control means combination and a process of handling mass printed communications or papers on an automatic predetermined programmed basis embodying the inventions taken in conjunction with the accompanying drawings, in which:

25 FIG. 1 is a front elevational view of a printing machine, a collating machine, automatic control panels, and counters in the combination of the invention.

30 FIG. 2 is an enlarged longitudinal fragmentary cross-sectional view of a portion of the collating machine of FIG. 1, showing the conveyor, switch gate, drum, pockets, tray, and sheet passage switches.

35 FIG. 3 is a schematic view of the controller panel illustrating its organization.

40 FIG. 4 is an enlarged diagrammatic view of the program tape, contact roll, and switch fingers and including signal apertures in the tape in an exemplary program; and

45 FIG. 5 is a schematic wiring diagram including counters, controls, machines, program tape, and switch fingers.

Referring generally to the drawings, it will be noted that a suitable combination includes a printing machine, sheet feeding means, a conveyor, a collating machine, and a programming control means. These are now described.

SHEET FEEDING MEANS

50 Automatic sheet feeding means for feeding already printed sheets may be used to supply sheets one at a time to the sorter or collator. Since a printing machine has this feature in addition to other desirable features, it is used also as the sheet feeding means in the explanation of the invention.

This machine may be a Multilith duplicating machine made by Addressograph-Multigraph Corporation or similar machines well known in the art. The printing machine has a supply of paper sheets, automatic sheet feeding means, automatic printing means, and automatic printed sheet ejection means, constituting sheet feeding means to the sorter or collator. The machine repeatedly prints sheets with the same material automatically. The machine has an electrical circuit and is driven by at least one electric motor. An electrically-actuated, manually-set counter is included in the printing machine circuit.

65 In operating the printing machine by itself the following normally applies. A count impulse switch is included in the circuit and is tripped to break or make a circuit upon a sheet being printed. The impulse from the switch effects actuation of the counter causing it to record one count upon the printing of one sheet. The operator initially sets the counter for the number of sheets to be printed. Upon each sheet being printed the counter counts down one. The counter has a switch located in

the power circuit of the printing portion of the machine. Upon the counter counting out, it opens the switch in the machine power circuit shutting down sheet printing at the desired number automatically. A manual start switch and the usual lock-in shunt circuits are used to start the machine and prevent the machine starting operation upon the count being set on the counter. The counter shuts off the paper feed to the printing section of the printing machine upon the proper number of sheets being fed to the printing section. A hold circuit continues to operate the printing section and the ejecting means until the sheets in process are printed and ejected whereupon a switch in the hold circuit opens and the whole printing machine shuts down. The number of sheets in transit or process is definite. In this instance two sheets are in process or transit. This counter control of the printer is altered as follows in the combination of the invention.

When the printing machine is connected with the collator and programmer means, the counter on the printer is by-passed until the programmer means connects the printer counter in to control the printer during the printing of the last few sheets, such as four sheets. This facilitates printing any number of sheets without first pre-determining the number and setting the number on the printer counter. The printer counter is thus set at four and when the programmer means gives back control of the printer to the printer counter, the printer counter controls printing the last four sheets and shuts down the printer. The printer counter is retained to permit using the printer individually.

COLLATING OR SORTING MACHINE

The collating or sorting machine is positioned adjacent the printing machine. It is equipped with a conveyor portion which receives the printed sheet from the printed sheet ejection means on the printing machine. Each time the printing machine prints a sheet, it ejects it to the conveyor of the collating machine. The conveyor of the collating machine moves the individual printed sheet toward the pocketed drum of the collating machine. The conveyor is driven by a motor in the collating machine circuit. The conveyor is driven independently of both the printing and the collating machine. Thus the printing machine and conveyor may be run to print and collect sheets in the storage tray without sorting them and without separating, disconnecting, or disassociating the printing machine, conveyor, collating machine, and the various mechanical and electrical connections.

A suitable collating or sorting machine is described in United States Patents Nos. 2,922,640 and 3,076,647. Patent No. 2,922,640 shows and describes an independent collating machine having its own sheet supply and sheet feed mechanism. Patent No. 3,076,647 shows and describes a collating machine having a conveyor portion for receiving individual sheets from a sheet feeding means such as a printing machine. The patent describes and shows printing machine and collating machine joint operation but it is limited to inserting one sheet in each drum pocket of the collating machine and it cannot automatically omit or multiply such insertion. This patent discloses means for printing sheets and accumulating them without operation of the collating machine and also discloses means for accumulating a certain number of sheets before or after the collating of single sheets. Both patents show and describe the unloading operation and means therefor.

Independently of the programmer means, the collating machine is also provided with a counter which counts down as a sheet is inserted in each sequential drum pocket. The collating machine counter may count out at fifty to the drum pockets and then open a shunt gate in the conveyor and the next sheets printed by the printing machine are delivered by the switch gate in the conveyor to a tray. However, when under the control of

the programmer, the collator counter is by-passed and the programmer controls the insertion of sheets in the drum pockets. At the end of a program, the collator counter may be reconnected in control of the collator so that the collator counter may control delivering a desired number of sheets to the tray after the sorting to the drum pockets is completed as controlled by the programmer.

In the process and in the combination of the machines, terminal countdown at the end of a program is returned to the collator counter for the last few sheets such as the last four sheets. The count of four is manually or automatically reset on the collator counter in the programmed process of the machines so that the counter is retained in the circuit for using the collator as an independent machine or with the printing machine without the programmer.

In the integration of the printing machine and collating machine in this invention, the foregoing independent and combined types of operation are provided so that they are optionally available to the user. However, with the combination of the programmer and the collating machine and printing machine, they are subject to the programmer, which is governed by the intelligence punched in the program tape.

While the combination and process retain the counters on the printer and collator, it is obvious that they may be eliminated entirely in the invention.

The passage of a sheet on the conveyor trips a switch and activates a sheet passage circuit to the programmer or the auxiliary counter or the collator counter. The switch may be positioned before the gate in the conveyor. However, two sheet passage switches are used preferably after the gate with one switch at the drum and the other switch at the tray. This provides distinguishable sheet count particular to a drum pocket and to the tray.

PROGRAMMER

The programmer is combined with the printer and collator so that it may control the insertion of one sheet or any selected, different, or identical number of sheets relative to each individual drum pocket or it may cause omitting inserting a sheet relative to any drum pocket on a preselected basis. The programmer is controlled by a punched tape. The sheet insertion intelligence is punched on the tape and is read and signaled to the collator. The program read by the programmer controls whether or not a sheet is inserted in each drum pocket, and if so, how many sheets are inserted in each drum pocket. The programmer may insert different numbers of sheets in the pockets of the drum as programmed on the tape.

The programmer is a step-reading mechanism. It has an electrical contact roll against which a plurality of feeler switch fingers close contact in various circuits later described. The contact roll has sprocket lugs. A tape lies over the roll and has openings receiving and engaging the lugs. The tape normally forms an electrical insulator between the contact roll and the switch fingers preventing closing contact in a circuit. The tape has punched information holes through which a switch finger may project into electrical contact with the contact roll to close a circuit. The sidewise location and linear position of the information holes or apertures in the tape is the intelligence on the tape as this determines which switch finger will close contact with the contact roll and condition a circuit relative to a certain pocket in the collator drum at any point in the program. Also more than one switch finger may make contact with the roll at one time to suit the program.

The roll is accurately held and accurately moved by an indexing device from one angular position or step to the next. The angular movement or step of the roll and its position between steps is controlled by an escape type mechanism including a solenoid stepper coil and a spring loaded ratchet means. The indexing is accomplished by

alternately energizing and deenergizing the solenoid stepper coil. When the stepper coil is energized its armature is moved. This (a) closes two sets of normally open relay contacts and (b) cocks and spring loads the ratchet pawl ready for movement. Conversely when the solenoid stepper coil is de-energized, the relay contacts open and the pawl is spring driven against the ratchet causing the roll to move one angular increment or step. The angular incremental step movement of the roll and its sprocket lugs moves the tape one step. The step of tape movement occurs relative to the passage of one printed sheet on the conveyor. This step is also relative to a certain drum pocket. Each programmed drum pocket has at least one step in the tape. A drum pocket may have several steps in the tape.

As hereinafter more fully described, the basic tape intelligence during normal operation may read "insert sheet or sheets" or "do not insert sheet" to a particular drum pocket. Under the "do not insert sheet" condition, the switch gate in the conveyor is swung diverting the sheet from the pocket to a storage tray. When the intelligence of the tape reads "insert one sheet" to a particular drum pocket, the conveyor gate remains directed to the drum and the sheet is inserted in that drum pocket and the drum is indexed one pocket. The punched intelligence of the tape may also read "insert X sheets" to a certain drum pocket. This is done by holding the drum with that pocket at the conveyor and continuing to insert sheets in the pocket until X number of sheets is inserted. As each sheet is inserted in the drum pocket or tray the tape is stepped. Stepping the tape four times without indexing the drum for example, inserts four sheets into a particular drum pocket. The drum then indexes one pocket.

Thus basically, the programmer has switch fingers reading intelligence holes or lack of holes in the tape during operation. One reads the tape as to whether or not to index the collator drum when a sheet passes. Another reads the tape as to whether to insert a single sheet, or multiple sheets into a drum pocket or zero sheets by diverting a sheet to the storage tray. The next or third feeler finger reads the tape intelligence to set up count-out at the printer counter and the collator counter which sends the drum home upon counting out after terminal count down. This conditions the system to print the terminal sheets, shut down the printing machine, convey the sheets, collate them, shut down the conveyor, and conditions the collator drum for shut down at its home position, so that it will be ready for the next program or operation cycle. The counters on the printing machine and collating machine are utilized for this purpose.

The terminal number of sheets is arbitrary and may be four sheets for example as stated. This number is set on the printing machine counter at the start of a cycle or it may be reset automatically at the end of the last cycle. However, the counter does not count until it is signaled to "count-out" by the switch finger reading the tape intelligence. As there are two sheets in transit after the printing machine counter, they are added to the collating machine count-out terminal number four. The number six then is set on the printing machine counter or it may be automatically reset at the end of a cycle. During normal operation the collating and sorting machine counters do not count and they start to count only when signalled to "count-out" by the switch finger reading the tape intelligence.

The count-out feature of the system maintains the counters in the control circuit of their respective machines so that they may be operated without the programmer. This maintains the full utility of the machines individually, with each other, and in combination with the programmer.

The terminal count down feature of the system also allows the number of sheets printed and collated to exceed the total possible count of a counter and/or the number of pockets in the collating or sorting machine. This en-

ables the printing or feeding of as many sheets as desired and the inserting of numbers of sheets in each pocket if desired without exceeding the count capacity of the counters. For example, if a collating or sorting machine drum has a hundred pockets, and six sheets per pocket are to be inserted, the printing machine will print and the collating machine will pocket six hundred sheets but each counter will only count the last few terminal sheets when signaled by the programmer.

The next switch finger reads the tape upon the tape program terminating and it closes an automatic pulse circuit to the programmer stepper coil sending the tape to its home position so that the programmer is conditioned for immediate operation to repeat the program or for the next operation.

The next switch finger of the programmer reads intelligence in the tape relative to an auxiliary counter. Upon this switch finger reading an "actuate auxiliary counter" signal it connects in an auxiliary counter or a bank of auxiliary counters. This also disconnects the programmer and it stops. The active auxiliary counter is set at X number. Upon the X number of sheets being inserted in the pocket at the conveyor, the auxiliary counter cuts itself out and sends a pulse to the programmer stepper coil. This places the programmer back in control of sheet insertion and the tape program continues. The tape program may use an auxiliary counter any time as required in a program. The auxiliary counter may automatically reset for the next time it is used or be manually reset for the next time it is used.

A bank of several auxiliary counters may be employed such as five or ten or more. The auxiliary counters are circuited to actuate sequentially. When the auxiliary counter circuit is activated, the first counter counts out and connects the circuit to the second counter. The next time the auxiliary counter circuit is activated, the second counter counts out and connects the circuit to the third counter. Thus the operator may place different counts on each auxiliary counter for different pockets and in this way large and different numbers of sheets may be inserted in certain pockets at definite places in the program.

Each switch finger of the programming device actuates a switch or relay which in turn opens and closes switch contacts affecting various circuits and other relay coils and they open and close switch contacts in various circuits, some of which include the printing machine counter relay, the collating machine counter relay, and in some instances the relays directly controlled by the switch fingers to obtain desirable conditions in the operation of the system or process.

More particularly, a printer 10 is positioned with its delivery end 11 at the receiving end 12 of a collator 14, FIG. 1. The printer 10 has a supply of paper sheets 15. The sheets 15 are picked up individually by the printer 10 and passed through a printing section 16 of the printer 10. After being printed, the printed sheet 15 is ejected at the delivery end 11 of the printer 10. The receiving end 12 of the collator 14 accepts the printed sheet.

The printer 10 has a quick-change printing mechanism 17, such as a stencil or a plate, and a counter 18 controlling the power circuit of the printer. The counter 18 when actuated counts out a selected number of printed sheets and shuts down the printer. The printer 10 may be operated individually by using the printer counter 18 separately with the printed sheets accumulating at the delivery end 11 of the printer.

The collator 14 preferably has a conveyor 36 leading from its receiving end 12, FIGS. 1 and 2. The conveyor 36 runs from the receiving end 12 past a tray 19 to a pocketed drum 20. The conveyor 36 has a switch gate 37 for directing a sheet to the drum 20 or to the tray 19. The position of the gate 37 is controlled by a solenoid in the circuits. The conveyor has two sheet passage switches 89 and 99 in sheet passage circuits. The counter 21 may control the circuits in a panel 22 of the collator 14 to

place a printed sheet in each successive pocket 38 of the drum 20. When the counter 21 is used, sheet passage switch 89 impulses the counter each time a sheet passes into a pocket 38.

The counter 21 may be used to control the collator individually. The counter 21 may be pre-set at thirty-eight or any other count less or equal to the number of pockets. Upon the counter 21 counting down to zero, it changes the collator circuits changing the switch gate 37 in the conveyor to deliver further printed sheets to the tray 19 and sends the drum to the home position. A desired number of printed sheets may be accumulated then in the tray 19. This is pre-planned by setting the printer counter 18 at a higher number than the collator counter 21. If the printer counter is set at sixty-three with the collator counter set at thirty-eight, twenty-five printed sheets will be delivered to the tray 19. Thus the collator 14 may be used separately and/or with the printer 10 as stated.

When the programmer is in control, the sheet passage switch 89 causes the programmer to advance one step upon the passage of a sheet except when an auxiliary counter is used. This is explained more fully hereinafter. The sheet passage switch 99 energizes a sheet passage circuit each time a sheet is delivered to the tray 19 and produces an impulse. This impulse is fed to the programmer. This causes the programmer to advance one step.

The controller or programmer is contained in a panel 23 on the collator 14. The controller, FIGS. 1 and 3, comprises a tape step reading mechanism 24, a relay bank 25, a connector plug 26, and wires leading between the step reading mechanism 24 and the relay bank 25, a transformer 27 and wires leading between the transformer 27 and relay bank 25, a receptacle 28 and wires leading between the relay bank 25 and the panel 22 on the collator 14 containing the collator control circuits. The relay bank 25 has a printed circuit board 29 making contact between the relays thereon, the connector plug 26, and the receptacle 28.

The step reading mechanism 24 has a rotatable contact roll 30 which is electrically connected in the programmer circuits. The roll has drive lugs 31. A punched tape 32 rolls with the roll 30 and has openings 33 engaging the lugs 31. A head 34 lies over the roll 30. The head 34 is pivotally mounted on a post 35 and is swung away from the roll 30 for mounting and removing a tape 32 relative to the roll 30. The head 34 has a latch holding it against the roll 30 in the position shown. The movement of the head 34 to the position shown closes a safety switch in the step reading mechanism 24 energizing the circuits. When the head 34 is pivoted away from the roll 30, the safety switch is opened deenergizing the head 34 and roll 30 circuits. Two wires from the contact plug 26 lead to the safety switch in the head 34. Suitable wires or circuits lead to and from a bank of auxiliary counters 39.

The head 34 has five feeler switch fingers 40, 41, 42, 43, and 44. Each switch finger 40-44 has a contact end pressed toward and normally riding on the tape 32 at the apex of the roll 30. The tape 32 has information apertures 45 through which the contact end of a switch finger 40-44 may project into electrical contact with the roll 30 to close a circuit. The coils of relays A, B, C, D, and J are respectively connected to the switch fingers 40, 41, 42, 43, and 44 in separate circuits by five wires leading to the connector plug 26. The roll 30 is connected to these relays by three wires leading through an on-off switch 45 to the connector plug 26 on the circuit board 29 on which the relays are mounted.

The roll 30 is incrementally angularly moved by a pawl and ratchet mechanism actuated by a spring and a stepper coil 46. The stepper coil 46 is connected in the system by two wires leading to the connector plug 26. When the stepper coil 46 is energized it actuates an armature 47 and loads a spring return and cocks the ratchet

mechanism. When the stepper coil 46 is deenergized, the spring return is released and the ratchet mechanism uncocks angularly advancing the roll 30 one step increment. A set of switch contacts 48 are positioned adjacent the armature 47 and are moved between their normally open and closed positions and their actuated positions by a lever 49 connected to the armature 47. The switch contacts 48 are connected by four wires to the connector plug 26.

The transformer 27 is connected by four wires to the printed circuit board 29. Eighteen wires lead from the printed circuit board 29 to the receptacle 28 which has three rows of six contacts each for connecting with a plug 50 inserted in the receptacle 28. The plug 50 has a cable 51 leading to the panel 22 on the collator 14. Two wires lead from the panel 22 to the counter 18 on the printer 10. The circuit through these wires controls the printer counter 18 to return control of the printer 10 back to the printer counter 18 to start count-out sheet-feed shutdown of the printer 10 prior to shutdown of the collator 14. This provides for the necessary "in-process" sheets being printed and conveyed. After the printer 10 sheet-feed stops feeding sheets, the "in-process" sheets are printed and conveyed and the printer 10 and the collator 14 are shut down.

The printer 10 has a separate power supply through and controlled by the printer counter 18. The collator has a separate power supply through the panel 22 from the plug 52, FIG. 5. The plug 52 supplies power to the collator 14, counter 21, panel 22, and the panel 23 housing the controller. This system is now described.

The plug 52 connects electric power to the system for which the system is designed or modified. One hundred fifteen-volt, sixty-cycle current is used as a suitable example. To allow for fixed connection of the plug 52, a switch 53 on the panel 22 controls a main on-off relay. This relay has a set of contacts MR1 connecting power to the system through the main supply lines 57 and 58 to both sides of a collator drum drive motor 54 and a set of contacts MR2 leading from the lines 57 and 58 connecting in both sides of a collator conveyor drive motor 55. Thus upon closing the switch 53, the system is energized and the motors 54 and 55 are running.

A rectifier 59 in the collator circuits lies between the lines 57 and 58 and supplies fast acting ninety-volt direct current to a clutch coil 60 and a brake coil 61. The drum drive motor 54 drives through a clutch 62, a brake 63, and a reduction gear 64 to the drum 20. The coils 60 and 61 are in the clutch 62 and brake 63 respectively. The clutch coil 60 is normally deenergized disconnecting drive to the drum 20. The brake coil 61 is normally energized holding the drum 20 in position. A multi-contact switch 65 controls the coils 60 and 61. The switch 65 is in turn controlled by a clutch relay R-L and a brake relay R-UL as hereinafter stated and as fully explained in U.S. Patent No. 3,076,647 covering the collator structure, circuits, and operation.

Supply line 57 and supply line 58A furnish power to the controller circuits. A direct current rectifier 66 and transformer 27 lie between the lines 57 and 58A. The rectifier supplies fast acting one hundred ten-volt direct current to the stepper coil 46, to a coil 67 of a relay H, and to a coil 68 of a relay Z. The transformer supplies twelve volt alternating current to a circuit including the roll 30, the switch fingers 40-44, and the coils of their respective relays.

The bank 39 of auxiliary counters is composed of several individual auxiliary counters 69. The counters 69 are interconnected in series so that upon the preceding counter 69 counting out, the succeeding counter 69 is connected in a controlling condition the next time an auxiliary counter is called for in the program.

The wiring diagram of FIG. 5 is schematic and the various components are positioned to show a clear diagram rather than to indicate where they are physically

located. The relays of the controller are designated with the capital letters A, B, C, D, E, F, G, H, J, X, Y, Z. The relays of the collator are designated by a letter prefix and a numeral with the exception of the clutch and brake of the drum drive; here the symbols R-L and R-UL are used. The symbols for the relays of the drum index circuit have the letter prefix C. Generally the switches operated by the relays are designated with the relay symbol and a prefix C for the switch contacts, such as CR4 and CRG.

The programmer is connected in control and disconnected by the following means. A manually operated switch 70 is shown closed with a pole 71 closing the rectifier 66 power circuit. An interlock switch 73 closes with a pole 74 closing the transformer 27 power circuit. This connects in the controller system controlling drum 20 indexing and controlling the position of the switch gate 37 in the conveyor 36. This drops out the collator counter as controlling drum 20 indexing and gate 37 position. The interlock switch 73 is controlled by the manual switch 70. To connect in the controller and take control from the collator counter 21, the manual switch 70 is closed relative to the pole 71 and this energizes the rectifier 66 and the transformer 27.

To connect in the collator counter 21 in control instead of the programmer, the manual switch 70 is closed with a pole 72. This energizes the coil 75 of a relay G opening switch CRG 76 disconnecting power to supply line 58A deenergizing the controller and deenergizing all the coils of all the relays of the controller except the coil 77 of relay E which now lies inactive. The collator 14 is thus operable under control of the counter 21 and without the programmer.

MAKE READY FOR CONTROLLER PROGRAMMING

The printer is loaded with paper sheets 15, the printer counter 18 set at four for "in-process-sheet" terminal count-down, and the printing media or stencil 17 mounted and the collator counter 21 is set at six. The printer may be test-run to evaluate proper printing.

The number one pocket of the drum 30 is at the conveyor. This is the home and start position. The drum is sent to this position automatically as later described to insure that the collator normally has its number one pocket at the conveyor.

The manual switch 70 is closed on pole 71 connecting in the controller circuits. A start switch 80 is closed in a shunt circuit to the collator counter clutch coil 81 which opens the counter switch 82 and moves a counter switch 83 off a drum home-circuit-pole 84 and to a drum-rotate-circuit pole 85 supplying power to the lead wire 57A of the drum rotate and pocket feed operation circuits. The relay contacts MR1 and MR2 are closed energizing the circuits and the drum motor 54 and the conveyor motor 55 are running.

The tape 32 is placed on the roll 30. The tape has been key-punched with the desired program. The tape is placed with the start of the program at the apex of the roll 30 under the switch fingers. The auxiliary counter 69 or each one of the bank 39 is set at the programmed or scheduled count.

The print switch 86 on the printer 10 then is closed and the printed sheets emit from the printer 10 to the conveyor 36 of the collator 14. The conveyor transports each sheet 15 individually to the switch gate 37. The sheet passage switches 89 and 99 are connected in a circuit to the programmer. At this point the punched tape controls the position of the gate 37 and the dwell of each drum pocket 38 at the conveyor 36 as the conveyor sheet passage switches 89 and 99 are connected in circuits effecting impulse to the stepper coil of the programmer upon the passage of a sheet through opening and closing contacts in their affected relays.

TAPE PROGRAM

The tape 32 is punched with information apertures 45. The lateral and longitudinal position of the apertures 45 or lack of an aperture 45 constitutes the program of the tape 32. The apertures 45 are laterally aligned with the switch fingers 40-44 and longitudinally spaced. The drive lug openings 33 may indicate one incremental movement of the roll 30. The apertures 45 are shown aligned with openings 33 to show their sequence relative to the switch fingers. The stepper-indexing mechanism advances the tape 32 the center distance between the apertures 45 with each step. Thus the information apertures 45 advance with the tape step-by-step relative to the switch fingers.

The tape 32 as punched in FIG. 4 has the following short program as an example:

Tape Steps	Drum Pocket No.	Sheet Count
1.....	1	One.
2.....	2	Zero.
3-4-5.....	3	Three.
6.....	4	Fifty—(Auxiliary counter).
7.....	5	One.
8-9.....	6	Two.
10.....	7	One.
11.....	8	Zero—Drum Home; Tape Home; Stop Program.

PROGRAMMED OPERATION

In the reading of the program, switch finger 40 reads one step ahead of the other switch fingers, FIG. 4. The switch finger 40 controls the circuit advancing the collator drum 20 one pocket 38 relative to the conveyor 36 or holding the drum 20 with any certain pocket at the conveyor for receiving several sheets as programmed.

The switch finger 40 by reading one step ahead of the other switch fingers positions a certain drum pocket 38 at the conveyor 36 so that a proper programmed pocket is at the conveyor 36 when the other switch fingers perform their functions relative to that drum pocket of the program. The contact of the switch finger 40 through an aperture 45 with the roll 30 advances the drum one pocket. The absence of an aperture 45 at the next step in the tape 32 prevents contact of the switch finger 40 with the roll 30 leaving the previously programmed drum pocket 38 at the conveyor. This allows a further plurality of steps of the program to insert a programmed plurality of sheets in that drum pocket held at the conveyor.

Switch finger 41 controls the circuits to the switch gate 37 in the conveyor 36. This gate 37 is spring biased to deliver sheets traveling the conveyor into the tray 19. A solenoid 88 when energized throws the switch gate 37 against the spring to deliver sheets traveling the conveyor into the drum pocket 38 at the conveyor 36. Thus when the solenoid 88 is energized it positions the gate to deliver sheets to the drum.

When the switch finger 41 does not encounter an aperture 45 in the tape 32 through which to make contact with the roll 30, its relay is not energized and the solenoid 88 circuit is not energized throwing the switch gate in the conveyor under the power of the spring to deliver a sheet 15 to the tray 19 at the step in the program. With this condition no sheet is inserted in the drum pocket at the conveyor.

When the switch finger 41 encounters an aperture 45 through which to make contact with the roll 30 its relay is energized closing a normally open switch to the gate solenoid. The switch gate changes position delivering the sheet on the conveyor to the drum pocket 38. With this condition one or more sheets may be inserted in the drum pocket 38 at the conveyor at that step of the program.

The insertion of one sheet or multiple sheets in each pocket is provided for by programming the tape 32 relative to switch finger 40. The tape may be left imperforate

relative to switch finger 40 for as many steps of the tape as desired in the program. Here the absence of apertures 45 in the tape 32 relative to switch finger 40 holds the drum pocket 38 at the conveyor 36 while the tape continues its step-by-step advance over the roll 30. Also, the presence of an aperture 45 in the tape 32 relative to switch finger 41 holds the switch gate 37 in the conveyor 36 in the delivery position to the drum. The tape program accordingly continues to feed sheet-after-sheet into the one drum pocket at the conveyor. This may be any desired number or plurality of sheets depending on the number of tape steps made while holding a drum pocket at the conveyor as each tape-step indicates the passage of a sheet on the conveyor into the drum pocket.

The auxiliary counter or a bank of auxiliary counters 39 is included as part of the programming means. This counter or bank of counters is provided to permit selective varying of a program punched on an individual tape not only to reduce the number of tapes but also to reduce the number of sheet insert steps in an individual tape. The auxiliary counters 69 may be by-passed in a program, used once in a program, or used as many times as desired in a program punched on an individual tape. Also an auxiliary counter 69 may be used at every pocket in the drum in a program. An auxiliary counter 69 may be of the automatic-reset type and reset itself at a selected count (after count out) to be ready upon being activated later. Also the operator may place the same count or different count on an auxiliary counter 69 for the next time it is used.

The auxiliary counter 69 when not energized has normally open and normally closed switch contacts which reverse upon the auxiliary counter being energized. When not energized the auxiliary counter 69 is inactive in a program. When energized it opens a set of normally closed contacts which disconnect the circuit to the programmer stepper coil 46. This stops the stepping of the tape. When energized the auxiliary counter 69 locks itself in through a shunt circuit. Upon the auxiliary counter counting out, it opens its shunt circuit contacts and the counter is deenergized and drops out. Upon the auxiliary counter dropping out, it closes the circuit to the programmer stepper coil 46 and this provides a pulse to the stepper coil 46 causing the programmer to advance the tape a step. This reactivates the programmer and the program continues according to the tape.

The auxiliary counter 69 is activated by the program of the tape. An auxiliary counter sequence is included in the tape and is part of the program. The switch finger 44 reads the auxiliary counter sequence in the tape. When the switch finger 44 encounters an aperture 45 in the auxiliary counter sequence of the tape, it closes a circuit energizing the auxiliary counter and the shunt circuit closes holding in the auxiliary counter and opens the circuit to the programmer stepper coil de-activating the programmer. The auxiliary counter when so energized closes a set of contacts connecting a circuit including the sheet passage switch to the auxiliary counter 69.

The sheet passage switch 89 closes a circuit as each sheet is inserted in the drum pocket 38 at the conveyor and impulses the auxiliary counter at the passage of each sheet. The auxiliary counter 69 counts down at each impulse from the sheet passage switch from the pre-set number to zero. Upon reaching zero, the auxiliary counter 69 breaks its holding shunt circuit deenergizing itself and its contacts revert to normal condition in the circuits. The stepper coil 46 is energized by a pulse upon the auxiliary counter counting out and the tape 32 is stepped an incremental step. This returns control of sheet pocketing to the programmer. The tape program then continues.

For example a program may call for at least ten sheets being inserted in each pocket. Thus the program tape may insert the sheets in excess of ten and then connect in the auxiliary counter to insert the last ten sheets in each

pocket. In such a program for a one hundred pocket drum, the use of the auxiliary counter reduces the program on the tape by nine hundred-"sheet insert" steps. The program may also use the auxiliary counter at a plurality of selected pockets as set forth in the example.

Another example of auxiliary counter use is where the operator manually sets the count on the counter for the next time it is to be activated. Here the operator has a program schedule and he sets the next scheduled count on the auxiliary counter. Here the count may be the exact number of sheets inserted in a certain pocket. After each actuation of the auxiliary counter, the operator sets the next scheduled count. Upon the next programmed actuation of the auxiliary counter, the counter controls the insertion of sheets to a pocket according to the count set. The manual operator setting of the auxiliary counter permits selectively varying the program of a tape. Here the tape may have a master program. The master program tape may be suitable for many identical programs but it cannot be varied or changed. However it may have an auxiliary counter programmed for actuation in the auxiliary counter sequence at the portions usually deviated from in the master program. The operator may thus vary the master program of the tape. This enables the master program tape to be used with variations for many programs. This reduces the required number of tapes and eliminates the necessity of making an individual tape for each deviation from the master program.

When a bank of auxiliary counters 39 is used, each auxiliary counter 69 may be used one or more times in a program. With ten auxiliary counters, and using each counter one time in a program, the operator may pre-set each counter for actuation at a certain point in the program. The following schedule is exemplary:

Pocket No.	Aux. Count. No.	No. of Sheets
12	1	30
19	2	55
30	3	40
39	4	20
44	5	10
45	6	36
51	7	25
62	8	45
74	9	60
98	10	32

When the tape program reaches pocket No. 12, auxiliary counter No. 1 is activated and thirty sheets are inserted in No. 12 pocket. No. 1 auxiliary counter is now counted out and has switched in No. 2 auxiliary counter. When the tape program reaches No. 19 pocket, auxiliary counter No. 2 is activated and fifty-five sheets are inserted in No. 19 pocket. No. 2 auxiliary counter is now counted out and has switched in No. 3 auxiliary counter. When the tape program reaches No. 30 pocket, auxiliary counter No. 3 is activated and forty sheets are inserted in No. 30 pocket. The remaining auxiliary counters 69 are similarly activated in the tape program.

The tape may be programmed to activate an auxiliary counter 69 at any point in the program for any particular pocket. Any plurality of the auxiliary counters of the bank may be used in a program and others not used. Also the whole bank 39 may be used one or more times with the operator resetting their count as desired in the program after the last auxiliary counter has counted out.

Thus a master program as punched on a tape programming an auxiliary counter for certain pockets may be varied as to the number of sheets for the certain pockets by the operator setting the desired count on each auxiliary counter in the bank. Thus the auxiliary counter or a bank of auxiliary counters provides program flexibility as well as substantially reducing the number of steps in a punched program on a tape, and substantially reducing the number of tapes required for programs.

The number of pockets in the drum determines the maximum size of a program such as for fifty or one hundred recipients. However a program may call for

fewer recipients than the maximum. When this occurs, there is a series of unused pockets in the drum at the end of a program.

Actually a user's programs may never use all the pockets in the drum. A user may program only a portion of the drum pockets most of the time. The invention therefore provides for terminating a program after using any number of pockets in the drum in a program and then sending the drum to its home position by-passing the remaining unused pockets and also sending the tape to its start position in the programmer automatically. To effect this on program a drum home sequence and a tape start-position sequence is included in the program on the tape.

The switch finger 43 reads the drum home sequence of the tape. An aperture 45 is punched in the tape in the drum home sequence adjacent the end of the pocketing program. Upon the switch finger 43 encountering the aperture 45, it makes contact with the roll 30 closing a circuit including the coil 105 of relay D. This energizes relay D which closes the clutch hold-in shunt circuit of the collator counter 21. The collator counter has been previously set at four for the terminal count down. Relay D when energized also closes a circuit between the sheet passage switch 89 and the collator counter count coil. As the terminal sheets pass into the drum the collator counter counts down to zero. Upon the collator counter counting out, it deenergizes the clutch coil 81 of the collator counter breaking its hold-in shunt circuit. When this occurs, the collator counter switch 83 opens off pole 85 disconnecting the pocketing circuits and moves on pole 84 connecting the drum home circuit. This causes the drum to rotate without regard to pockets to its home position. Upon the drum arriving at its home position, a detent on the drum opens the drum home position switch in the homing circuit and the drum stops at the home position. This shuts down the collator automatically with the drum at the home position.

The switch finger 42 reads the tape start-position sequence in the tape. An aperture 45 is punched in the tape, in the tape start position sequence, to stop the tape at the correct place for the start of the next pocketing program. Upon the switch finger 42 encountering the aperture 45, it makes contact with the roll 30 energizing the coil 103 of relay C which closes a contact (CRC200) and opens a contact (CRC201) stopping the tape. The tape may be stopped at a place ready to be moved by one step into the first step of its program or at the first step of its program depending on which is the case in the integration of the device. While the switch finger 42 stops the tape at the correct position, it does not step the tape past unprogrammed portions after a program is completed. The tape is stepped past unprogrammed or terminal portions as follows.

When the collator counter counts out as previously described in conjunction with positioning the drum at its home position the collator counter, in closing the home circuit switch, also closes a switch to the coil of relay F202 and opens the circuit to relay coil E77. When relay F is energized it closes its normally open contacts 203. When relay coil E77 is deenergized this establishes a circuit through closed contacts 204-201-205-206 energizing the stepper coil 46. When the stepper coil 46 is energized, one of its contacts 207 is closed energizing the coil of relay H67. When the coil of relay H67 is energized, one of its other contacts 205 opens in the circuit to the stepper coil. Thus in the stepper coil 46 terminal run, its circuits are connected in by the drum home switch. The stepper coil may be considered energized but deenergized by the position it assumes when energized. This alternately energizes and deenergizes the stepper coil 46 and alternately cocks and uncocks the stepping mechanism causing it to step the tape. This action occurs rapidly as each time the stepper coil is energized, it moves to break its energizing circuit, and

upon it breaking its energizing circuit, it moves to connect its energizing circuit.

As previously stated, upon the switch finger 42 encountering the aperture 45 in the tape start-position sequence, it makes contact with the roll 30 energizing a coil of relay C103 which opens a normally closed switch 201 in the stepper coil homing circuits making it impossible for the stepper coil to re-energize itself and leaves it in its deenergized position. This stops further stepping of the tape at the start of the program on the tape.

Further, when the coil of relay C103 is energized relay contact CRC200 closes. With the drum home switch at home position the coil of relay F202 is also energized. This being energized closes relay switch CRF203 completing the shunt circuit around the start switch energizing the counter clutch 81 and placing the collator circuit in the start, or ready, condition. This circuit locks itself in and will stay in this condition until manually reset, or until counter count out.

With the counter clutch 81 energized and locked in, relay coil CRE77 is energized closing its contact CRE208 and opening its contact CRE204. Any further pulses to the stepper coil 46 must now come through relay contacts CRE208 and CRX209. This condition will remain until the counter clutch 81 is manually reset, or until counter count out occurs.

FIG. 5 wiring diagram shows all the relays deenergized and with the position of their respective switch contacts under this condition. All other switches are shown off. Thus it will be understood when the relays are energized and the other switches closed, that the position of the switch contacts will be changed from that shown. It is also understood that the programmed operation starts with the drum and tape at their home or start positions.

The operator supplies the printer with a supply of sheets and conditions the printer for printing the sheets. In closing the printer circuits the collator automatically places the drum at home.

With the printer 10 ready to print and the drum 20 at home, the operator places a tape 32 on the roll 30. He sets the count on each auxiliary counter 69 in the program. He closes the switch 70 on the pole 71 connecting in the programmer rectifier 66 and transformer 27 circuits. This leaves relay CRG unenergized. The operator closes the collator master switch and this closes the contacts MR1 and MR2. This energizes the system. The drum drive motor 54 and the conveyor motor 55 are running and the drum clutch and brake circuits are energized through rectifier 59. Only the brake circuit is activated. The operator then closes the print switch on the printer 10 and the printer emits printed sheets to the conveyor 14. The conveyor advances each sheet to the gate 37.

The tape is at the start or step 1 position and the drum No. 1 pocket is at the conveyor in the program of FIG. 4. Switch finger 41 at the start is in contact with the roll 30 energizing conveyor gate solenoid 88 through relay CRB and switch 87 directing sheets to the drum. Switch finger 40 is in contact with the roll 30. Both their circuits are interrupted by the parallel sheet passage switches. The first sheet is delivered and conveyed to the drum No. 1 pocket by the tape start position and the sheet passage switch 89 is actuated. This steps the roll 30 and moves the tape 32 to its step 2 position. The roll 30 is stepped by deenergizing the stepper coil 46 permitting the spring powered ratchet to advance the roll. Thus when the stepper coil 46 is next energized, the roll will not step but its drive mechanism will be ready to step. The stepper coil 46 is deenergized when contact CRX209 in its circuit is open.

Also upon the sheet passage switch 89 closing, the drum is indexed one pocket as switch finger 40 is in contact with the roll 30. This energizes its relay CRA210 and this closes its contact CRA211 in the cir-

cuit of relay CR1-213 so that upon a sheet passage closing switch 89, the coil of CR1-213 is energized. Upon relay CR2-214 being energized it changes its contacts and locks itself in and closes a circuit to relay R-UL215. This throws switch 65 deenergizing brake coil 63 and energizing clutch coil 62. The drum rotates one pocket with the detent at the next pocket breaking the hold circuit to relay CR1-213. Upon breaking the hold circuit the relay R-UL216 is energized, energizing brake coil 63 and deenergizing clutch coil 62. The drum has now been indexed one pocket.

The tape is now at step 2 and the drum is now with pocket 2 at the conveyor. The programmer switch finger 40 makes contact with the roll 30 but the switch finger 41 does not make contact with the roll 30 as there is no aperture 45. The gate solenoid 88 is thus not energized and the gate 37 is directed to the tray 19. The second sheet now passes.

The second sheet is deposited in the tray 19 and not in pocket 2 and its passage actuates sheet passage switch 99. This causes the tape to advance one step to step 3 and it also causes the drum to index one pocket with pocket 3 at the conveyor.

At step 3 there is no aperture 45 for switch finger 40 and the drum will not index upon a sheet passing relative to step 3. There is an aperture for switch finger 41 at step 3 however, so the sheet passing will be directed by gate 37 to the drum pocket No. 3. This sheet now passes and the tape is moved to step 4. The next sheet is deposited in pocket No. 3 and drum pocket No. 3 held at the conveyor and the tape advanced to step 5. There are now two sheets in pocket No. 3.

At step 5 both switch fingers 40 and 41 make contact with the roll 30. The next sheet now passes into pocket No. 3 making three sheets in pocket No. 3 and the tape is stepped to step 6.

At tape step 6 relative to pocket 4, the auxiliary counter 69 or bank 39 is activated as switch finger 44 makes contact with the roll 30 as do switch fingers 40 and 41. The circuit of switch finger 41 is closed and the gate 37 directs sheets to the drum pocket No. 4. The circuit to the tape stepper coil 46 is held closed and the circuit of switch finger 40 is interrupted by the switch contacts of the auxiliary counter and upon a sheet passing to pocket 4 under this condition, the drum is not indexed and the roll is not stepped. Auxiliary counter is set at fifty in this instance. The sheet passage switch 89 now impulses the auxiliary counter 69 for the next fifty sheets and the auxiliary counter 69 counts down to zero. Upon the auxiliary counter counting out, its switch contacts in the drum index circuit change including the switch finger 40 and the drum is indexed one pocket moving pocket No. 4 from the conveyor and placing pocket No. 5 at the conveyor. Also upon counting out, the auxiliary counter opens the circuit to the stepper coil 88 and the stepping mechanism advances the tape one step to step 7.

At step 7 one sheet is inserted in pocket 5. At steps 8 and 9 two sheets are inserted in pocket 6. At step 10 one sheet is inserted in pocket 7. At step 11 no sheet is inserted in pocket 8 and the tape stop and tape home circuits are activated by switch fingers 43 and 42 and the tape is moved to its start position.

From the foregoing it will be understood that upon the passage of a sheet on the conveyor that either the sheet passage switch 89 to the drum is closed or the sheet passage switch 99 to the tray is closed. Thus each time a sheet passes, the sheet passage circuit is closed. In program operation the sheet passage circuit is used to:

- (A) Step the tape or pulse an auxiliary counter.
- (B) Index the drum when programmed.
- (C) Shut down system on last sheet programmed.

ELECTRICAL OPERATIONAL SEQUENCE PROGRAMMER CONTROL

The schematic wiring diagram of FIG. 5 is drawn with all switches off, drum in home position and all relays de-

energized. Switch 65 (CLI) is a double-pole, double-throw latching relay and relays CR-1 through CR-6 are conventional three-pole, double-throw relays.

Master switch on printer (Multilith) is closed sending current to terminal 84 on the counter which in turn furnishes power to the common side of the home switch. If the drum is at any position except home with the home switch closed on the detent, power will then be fed through the normally closed contacts CR3-217 and CR5-218 which will energize R-L219. When R-L219 is energized contact R-L221 closes and contact R-UL220 opens causing the drum to rotate. When the drum reaches home position and the normally open contact of the home switch is closed by the detent, power is fed through contacts CR4-222 and to CR3-223 to R-UL216 which in turn closes contact R-UL220 and opens contact R-L221 causing the drum to stop its rotation at home position.

Start button 80 is now pressed momentarily energizing the counter clutch which seals itself in by the closure of contacts numbered 83 and 85 through contacts of switch 82. Pressing the reset button at this time or at any time the counter clutch is sealed in will interrupt the circuit causing the clutch to drop out opening contacts numbered 83 and 85. As previously described closure of relay contacts CRF203 and CRC200 form a shunt circuit around start button 80.

COUNTER SET CIRCUIT

As previously described, the stepping mechanism 34, upon machine count out has a "home position" seeking circuit. Upon reaching the "home position" hole, the coil of relay CRC103 is energized through a circuit completed by switch finger 42. This act closes contacts CRC200 completing a circuit through the previously closed CRF203 to the counter clutch coil 81. When this coil is energized the counter switch contacts move from the 83-84 position to the 83-85 position providing a self-locking circuit. When these counter switch contacts change position the coil of CRF202 is deenergized opening contacts CRF203 and the coil of relay CRE77 is energized closing contacts CRE208 and 224-225 and opening contact CRE204. The action of the reject gate solenoid is dependent upon the condition of relay contact CRB87 or CRG227 which we shall discuss later.

SHEET ACCEPT AND REJECT CIRCUIT

If, after the collator counter 81 has been energized and self-locked into the ready position, a tape information hole is presented under switch finger 41 a circuit will be completed to relay coil CRB228. With this relay coil energized, relay contact CRB87 will be closed completing a circuit through the reject gate solenoid 88. With the reject gate solenoid activated the gate itself is pulled down directing passage of a sheet of paper under the "sheet accept" switch 89 and into the drum. Conversely, if no hole is presented at this time, or any other time during normal operation, the above sequence of events will not transpire and a sheet of paper will be directed under the "sheet tray" switch 99 and into the receiver tray.

With the coil of relay CRB228 energized relay contact CRB226 is closed and during normal sheet feeding, as will be explained later, relay contact CRZ225 closes forming a sealing circuit and preventing gate "flutter" between successive sheets of paper.

DRUM INDEX

With the collator counter clutch coil 81 energized and locked in the "set" position a circuit is established to one side of stepper contacts 229, the common of the sheet tray switch 99, the common of the sheet pocket switch 89, one side of relay contacts CRA211, one side of relay contacts CRD230 and through normally closed relay contacts CRA212, further through the contacts CRG231 to the coil of relay CR2-214 in the conventional collator in-

dexing circuit. Relay CR2-214 in the conventional indexing circuit is self-sealing through contacts R-UL215 and CR2 and conditions the rest of the circuitry for one indexing operation.

Now if switch finger 41 senses a hole in the tape, relay contact CRB228 will close directing a sheet of paper under the "sheet pocket" switch 89 and into the drum. With the passage of a sheet of paper under the "sheet pocket" switch 89 the contact points of this switch reverse sending an electrical pulse through the relay contact CRG233, further through normally closed relay contacts CRY234 and energizes the coil of relay CRX235; with the coil of CRX235 energized relay contacts CRX209 are closed, energizing the stepping mechanism through the previously closed and sealed relay contacts CRE208 and relay contacts CRX236 are closed energizing the coil of relay CRZ68.

As previously mentioned, in the sheet accept circuit, if a hole had been presented under switch finger 43, energizing the gate solenoid relay contact CRZ225 would close forming a locking circuit to prevent "gate flutter" between sheets. This act has been accomplished.

With the relay coil CRZ68 energized, relay contact CRZ237 is opened so that there is no possibility of completing a circuit through switch fingers 40 or 42 through the coils of relays CRA210 or CRC103.

Meanwhile, two steps back, it is explained how the stepping coil 46 is energized through relay contacts CRE208 and CRX209. This act closes stepper contacts S1-229 and "cocks" the stepping mechanism to index once.

With the closure of stepper contacts S1-229 the coil of relay CRY238 is energized closing contact CRY239 and opening contact CRY234. Inasmuch as a sheet of paper is still under the "sheet pocket" switch 89, the coil of CRY238 is held energized until this sheet of paper clears said switch. When relay contact CRY234 opens the coil to relay CRX235 it is deenergized opening relay contacts CRX209 and 236. With the opening of contact CRX209 the coil of the stepping mechanism 46 is deenergized allowing the stepping mechanism to index one position. The opening of contact CRX236 deenergizes the coil of relay CRZ68 closing contact CRZ237.

Because of the delay in closing relay contact CRZ237 and the extreme speed with which the stepping mechanism indexes, the tape always completes its movement prior to closure of contact CRZ237.

If upon completion of tape indexing, a hole is presented under switch finger 40 a circuit will be completed to one side of the coil of relay CRA210. Upon closure of contact CRZ237 a full circuit will be completed energizing the coil of CRA210. With the coil of CRA energized contact CRA212 opens and contact CRA211 closes completing a circuit to relay contact CR2-240, which has been previously described as closed and sealed. Through the conventional collator indexing circuitry an electrical pulse is sent to the latching relay causing the drum to index one pocket.

Conversely, if no hole is presented to switch finger 40 no circuit will be completed to relay coil CRA210. Therefore a sheet will be accepted into a pocket of the drum with no indexing taking place.

When the sheet clears the "sheet pocket" switch 89 the sealed circuit to the coil CRY238 is broken and the circuitry returns to normal operating conditions.

If relay contact CRB87 is open and a sheet of paper is directed under the "sheet tray" switch 99 the electrical operation is identical except that no sheet of paper is inserted into the drum.

COUNT OUT AND STOP

During the normal progression of the tape, at a point five sheets from the end of the program a counter count hole will be presented to switch finger 43 energizing the coil of relay CRD105. This closes relay contacts

CRD230, 243, and 106. With the closure of relay contacts CRD106 a sealing circuit is established through previously closed relay contacts CRE224 to the coil of relay CRD105.

Relay contacts CRD230 are similarly closed and held closed. Thereafter, and until count out, with the passage of every subsequent sheet of paper, relay contacts CRY241 close and open, establishing an alternating pulsing cycle to the counting coil of the collator counter. This process continues until the counter is counted out at which time counter switch 82 momentarily opens allowing the clutch coil 81 to deenergize. With the counter clutch coil 81 deenergized the counter switch contacts 83-85 revert to the 83-84 position and the counting circuit is dead.

At the same time as the immediately preceding described operation, relay contacts CRD243 effect closing, establishing a completed circuit to the terminal board and counter of the printer.

HOME SEEKING CIRCUIT

With "count out" of the collator counter, contacts 82 momentarily open allowing the counter clutch coil 81 to deenergize. When this coil deenergizes contacts 83-85 move to the 83-84 position. This action deenergizes the coil of relay CRE77 closing its contacts 204. At the same time, through the normally closed contacts of the home switch 244, the coil of CRF202 is energized closing its normally open contacts 203. If the tape is not at the home position an electrical circuit is established through normally closed contacts CRE204, CRC201, CRH205, and CRX206 energizing the stepper coil 46. When the stepper coil 46 is energized one of its contacts 207 is closed energizing the coil of CRH67. When this coil of CRH67 is energized contact CRH205 opens interrupting the circuit to the stepping coil. Thus one complete sequence of motion is made in the indexing operation. This process is repeated until switch finger 42 senses a "home position" hole in the tape at which time the coil of CRC103 is energized closing contact CRC200 and opening CRC201. These two actions interrupt the pulsing circuit to the stepping coil and also energize the clutch coil 81 of the collator counter through the previously closed contact CRF203.

AUTO-MANUAL SWITCH

The auto-manual switch is a single-pole, double-throw toggle switch which energizes relay coil CRG75. CRG relay is a six-pole, double-throw relay with contacts indicated at 76, 227, 231, 233, 245, and 246.

The sole purpose of this switch and controlled relay is to change the collator operation from automatic tape reading to basic conventional.

AUXILIARY COUNT CIRCUIT

During the normal course of feeding paper in conjunction with the tape reader a hole may appear in a channel designated for an auxiliary, or external counter. This hole will energize the coil of relay CRJ247 which in turn closes the operating contacts of CRJ248.

Inasmuch as this stepping procedure at the tape reader occurs only with a sheet of paper under the sheet pocket switch, no power is transferred through the CRJ248 contacts until the paper clears the sheet pocket switch. When the paper does clear the sheet switch, power is then transferred through the contacts of CRJ248, through the "on-off" switch 249 to the coil of TDRF250. The coil of TDRF250 is then locked in the energized position through the normally closed contacts of the auxiliary counter R-2-251 and the now closed contacts of TDRF-252. A parallel circuit similarly locks the clutch coil 257 of the auxiliary counter.

With the energizing, and locking, of the coil of TDRF-250 the relay contacts of TDRF253 and 254 switch and

transfer successive sheet pulses to the count coil, or coils, of externally controlling counters. These counters may be mounted singly or in series multiples and may be any one of several commercially manufactured electric impulse counters.

This sequence shall be described concerning a single counter. At count out R-2 contacts 255 close. This contact pulses the tape reader causing a movement of one step (under normal conditions, this step in the tape would move the tape to a "drum index" hole).

Also at "count out" contacts R-2-251 and 256 open preventing further sheet impulses to be transferred to the auxiliary counter count coil 69 and opening the sealing circuit to relay coil TDRF250 and the auxiliary counter clutch coil 257.

With the coil of TDRF250 now deenergized relay contacts TDRF253 and 254 assume their normal position and further sheet impulses are channelled to the normal stepping mechanism circuitry.

For single sheet sorting without the use of the programmer, the operation is the same as shown and described in the cited patents.

While the devices and circuits have been disclosed and described as being normally energized or non-energized and switches disclosed and described as normally open and normally closed, it is obvious that the various components may be otherwise connected in circuitry and have other normal conditions.

With the selectably programmed machine combination and process of the invention a single operator may print and collate mass communications in recipient identified stacks having desired omissions or multiples of copies of the communications for each recipient in a very short time in one operation wherein the blank sheets are inscribed and collated to finished distribution automatically. The invention obviates all the time, space, and labor inherent in the prior art; reduces what was heretofore highly complex, long, spread out, and laborious functions to a quick, accurate single operation.

Although but a few embodiments of the invention, devices, and process have been disclosed and described in detail, it is obvious that many changes may be made in the size, shape, detail and arrangement of the various elements of the invention within the scope of the appended claims.

I claim:

1. Sheet handling mechanism for automatically accumulating separate stacks of sheets in identified stack sequence with each stack having variably selectable known numbers of sheets,
 comprising
 sheet feeding means repeatedly emitting one sheet at a time,
 a conveyor having a receiving end accepting each sheet as it emits from said sheet feeding means; said conveyor having a delivery end projecting each sheet one at a time;
 a rotatable drum at said delivery end of said conveyor for receiving sheets from said conveyor,
 sequential pockets in said drum for holding sheets in separate stacks in said drum,
 a drive for rotating said drum,
 a clutch when actuated connecting said drive to said drum and normally disconnecting drive from said drum,
 a clutch circuit,
 a clutch switch in said clutch circuit for actuating said clutch, to connect said drive to rotate said drum to move said pockets relative to said delivery end of said conveyor to present said pockets selectively to receive sheets delivered by said conveyor,
 a brake normally holding said drum with one said pocket of said drum at said delivery end of said conveyor,
 a brake circuit,

a brake switch in said brake circuit for de-actuating said brake to free said drum for rotation,

a sheet passage switch at said conveyor actuated by the passage of a sheet on said conveyor to produce an impulse,

a step-reading programmer,
 stepping means in said programmer for moving a tape in sequential steps,

a sheet impulse circuit including said sheet passage switch and said programmer stepping means transmitting impulses from said sheet switch to said stepping means,

said stepping means in said programmer for moving a tape one incremental step on impulse from said sheet switch upon passage of one sheet to a said pocket,
 a program tape in said programmer having a sequence of hold-pocket signals and move-pocket signals in incremental program steps;

a pocket position switch-finger in said programmer reading said hold-pocket signal move-pocket signal sequence in said tape,

said switch-finger upon reading a move-pocket signal changing a drum drive circuit actuating said brake switch to free said drum and actuating said clutch switch to connect said drive to move said drum,

and means on said drum at each said pocket breaking said drum drive circuit upon a next said pocket locating at said delivery end of said conveyor disconnecting said clutch and setting said brake;

the number of program steps in said tape having hold-pocket signals preceding a move-pocket signal programming the number of sheets delivered to a one said pocket at said delivery end of said conveyor;

said step reading programmer stepping means advancing said tape one step upon the passage of each sheet into each said pocket with said clutch deactivated and said brake activated holding each said pocket at said conveyor as sheets pass into each said pocket at each program step having a drum-hold signal on said tape with the number of consecutive drum-hold signals on said tape read by said switch-finger determining the number of sheets passed into each said pocket;

the presence of a move-pocket signal in the program sequence on said tape read by said switch-finger changing said circuit releasing said brake and actuating said clutch to rotate said drum to move said pocket at said conveyor away from said conveyor and to advance the next said pocket to said conveyor;
 said program on said tape in said programmer having the sheet-to-pocket delivery step sequence signals and a drum hold-pocket-or-move-pocket step sequence signals coordinated with each other correlating sheet delivery steps to each said drum pocket with hold-move steps to each said drum pocket to effect delivery of the desired number of sheets in each said pocket.

2. In a sheet handling mechanism as set forth in claim 1 means for passing a pocket past said conveyor as said conveyor transports sheets without inserting a sheet in selected pocket, comprising

a gate in said conveyor swingable between a position delivering sheets to said drum and a position diverting sheets from said drum, gate operating means for swinging said gate between said positions and holding said gate in either position,

a gate circuit for actuating said gate operating means,
 a gate position switch-finger in said programmer operating said gate circuit,

a gate-operation sequence in said tape having gate-deliver signals and gate-divert signals read by said deliver-divert switch finger as said tape is stepped by said stepping means;

said gate-position switch finger upon reading a gate-deliver conditioning said circuit and said gate operat-

ing means positioning said gate to deliver a sheet to a said pocket at said conveyor;

said gate position switch-finger upon reading a gate-divert signal conditioning said circuit and said gate operating means positioning said gate to deliver a sheet to a said pocket at said conveyor;

said gate-deliver signals and said gate-divert signals being correlated with said pocket-hold and pocket-move signal sequence in said tape relative to the sequential order of said pockets in said drum to condition said gate to deliver or divert sheets transported on said conveyor relative to each said pocket of said drum as each said pocket is positioned at said conveyor.

3. In a sheet handling mechanism as set forth in claim 1, means for inserting a selected plurality of sheets in a certain said drum pocket without including the entire sheet plurality as signal steps in the tape, comprising

an auxiliary counter,

a latching relay in said counter having a solenoid, normally open position switch contacts, and normally closed position switch contacts actuated by said solenoid to change their position upon the condition of said solenoid changing,

a set of auxiliary counter normally closed switch contacts in said sheet passage switch impulse circuit to said stepping means of claim 1,

a count coil in said auxiliary counter,

a sheet passage switch impulse to auxiliary counter circuit from said sheet passage switch to said count coil of said auxiliary counter,

a set of auxiliary counter normally open switch contacts in said sheet passage switch impulse to auxiliary counter circuit,

count means in said counter for registering a count actuated by said count coil upon said count coil being impulsed,

said count means registering a pre-set number of impulses and then assuming a counted-out condition, an auxiliary counter sequence in said tape having auxiliary counter actuate and non-actuate signals at each step of said tape program,

an auxiliary counter switch finger in said programmer reading said auxiliary counter signals,

an auxiliary counter circuit leading from said auxiliary counter feeler finger to said auxiliary counter solenoid,

said auxiliary counter switch finger upon reading an auxiliary counter actuate signal in said tape changing said auxiliary counter circuit to actuate said relay to change and latch the condition of said normally open and closed contacts whereupon further pulses from said sheet passage switch actuate said counter count coil as each sheet passes into a selected said pocket at said conveyor until said counter assumes its counted out condition,

and unlatching means in said counter tripped by said counter assuming its counted out condition for unlatching said relay and returning sheet passage switch impulses back to said tape stepping means of said programmer after the pre-set number of sheets has been loaded in a certain selected pocket by said auxiliary counter without stepping said tape.

4. In a sheet handling mechanism as set forth in claim 1, means for terminating stepping said tape in said programmer, comprising,

a stop tape relay having a set of normally closed contacts in said sheet passage switch impulse circuit,

a stop tape switch finger in said programmer, a circuit including said relay and said stop tape switch finger,

means causing pulses in said circuit, and

a stop tape sequence in said tape having a stop tape signal read by said stop tape switch finger;

said stop tape switch finger reading a stop tape signal in said tape actuating said relay to change condition opening said normally closed contacts in said impulse circuit interrupting impulses to said stepper coil stopping the stepping of said tape.

5. In a sheet handling mechanism as set forth in claim 1 means for sending said drum home without program stepping past unused pockets, comprising a home pocket on said drum such as the pocket number one providing a start and end position in rotating said drum,

switch tripping means on said drum relative to said home pocket,

a normally drum home pocket switch tripped by said tripping means when said drum home pocket is at said conveyor to open said drum home pocket switch,

a drum home pocket latching relay having normally open, normally closed switch contacts, and a solenoid actuating said contacts,

a set of said (normally open) contacts in said drum drive clutch circuit,

a set of said (normally closed) contacts in said drum drive brake circuit,

a drum home circuit including said solenoid and said home pocket switch,

a home switch finger in said programmer,

a relay actuated by said switch finger having contacts in said home circuit,

a drum home position sequence in said tape having a homing signal at a selected step position after the desired number of pockets have been programmed as to sheet insertion,

said drum home switch finger reading said home sequence of said tape;

said drum home switch finger upon encountering said home signal energizing said relay to change said drum home circuit condition to change said relay condition to change said contacts condition releasing said brake and engaging said clutch to rotate said drum past unused pockets in said drum until said tripping means opens said home pocket switch whereupon said home circuit is broken disconnecting said clutch and setting said brake stopping and holding said drum at its home position.

6. In a sheet handling mechanism as set forth in claim 5,

a collator counter including said drum home latching relay having said normally open and closed contacts and said solenoid actuating said contacts,

said collator counter also having a clutch coil, a count coil, and count means actuated by said count coil, said collator clutch coil being actuated by said switch finger actuated relay to activate said counter,

said counter upon being actuated disconnecting said sheet passage impulse switch circuit from said programmer and connecting it to said counter count coil;

the passage of sheets after said counter is energized pulsing said count coil of said counter activating said count means;

said count means upon counting out disconnecting said collator pocketing circuits and connecting said collator drum home circuit whereupon said drum runs to and stops at said drum home position.

7. Sheet handling mechanism for automatically accumulating separate stacks of sheets in identified stack sequence with each stack having variably selectable known numbers of sheets,

comprising,

sheet feeding means repeatedly emitting one sheet at a time,

a conveyor having a receiving end accepting each sheet as it emits from said sheet feeding means; said conveyor having a delivery end projecting each sheet one at a time;

a movable receptacle at said delivery end of said conveyor for receiving sheets from said conveyor;
 sequential pockets in said receptacle for holding sheets in separate stacks,
 a drive for moving said receptacle one pocket relative to said conveyor, 5
 means for actuating said drive including a drive circuit, a switch in said drive circuit for actuating said drive to move said receptacle pockets relative to said delivery end of said conveyor to present said pockets sequentially to receive sheets delivered by said conveyor, 10
 a sheet passage switch at said conveyor actuated by the passage of a sheet on said conveyor to produce an impulse, 15
 a step-reading programmer,
 stepping means in said programmer for moving a tape in sequential steps,
 a sheet impulse circuit including said sheet passage switch and said programmer stepping means transmitting impulses from said sheet switch to said stepping means, 20
 said stepping means in said programmer for moving a tape one incremental step on impulse from said sheet switch upon passage of one sheet to a said pocket, 25
 a program tape in said programmer having a sequence of hold-pocket signals and move-pocket signals in incremental program steps;
 a pocket position switch-finger in said programmer reading said hold-pocket signal move-pocket signal sequence in said tape, 30
 said switch-finger upon reading a move-pocket signal changing said drive circuit actuating said drive to move said receptacle one pocket, 35
 the number of program steps in said tape having hold-pocket signals preceding a move-pocket signal programming the number of sheets delivered to a one said pocket at said delivery end of said conveyor;
 said home switch finger reading said home sequence of said tape; 40
 said home switch finger upon encountering said home signal energizing said relay to change said home circuit condition to change said relay condition to change contacts condition engaging said drive to move said unused pockets in said receptacle past said conveyor until said tripping means opens said home pocket switch whereupon said home circuit is broken disconnecting said drive stopping said receptacle at its home position.
 8. A gate in said conveyor swingable between a position delivering sheets to said receptacle and a position diverting sheets from said receptacle, gate operating means for swinging said gate between said positions and holding said gate in either position, 50
 a gate in said conveyor swingable between a position delivering sheets to said receptacle and a position diverting sheets from said receptacle, gate operating means for swinging said gate between said positions and holding said gate in either position, 55
 a gate circuit for actuating said gate operating means, a gate position switch-finger in said programmer operating said gate circuit, 60
 a gate-operation sequence in said tape having gate-deliver signals and gate-divert signals read by said deliver-divert switch finger as said tape is stepped by said stepping means; 65
 said gate position switch finger upon reading a gate-deliver signal conditioning said circuit and said gate operating means positioning said gate to deliver a sheet to a said pocket at said conveyor; 70
 said gate position switch finger upon reading a gate-divert signal conditioning said circuit and said gate operating means positioning said gate to divert a sheet from said pocket at said conveyor;
 said gate-deliver signals and said gate-divert signals be-

in correlated with pocket-hold and pocket-move signal sequence in said tape relative to the sequential order of said pockets in said receptacle to condition said gate to deliver or divert sheets transported on said conveyor relative to each said pocket of said receptacle as each said pocket is positioned at said conveyor.
 9. In a sheet handling mechanism as set forth in claim 7, means for inserting a selected plurality of sheets in a certain said pocket without including the entire sheet plurality as signal steps in the tape, comprising
 an auxiliary counter,
 a latching relay in said counter having a solenoid, normally open position switch contacts, and normally closed position switch contacts actuated by said solenoid to change their position upon the condition of said solenoid changing,
 a set of auxiliary counter normally closed switch contacts in said sheet passage switch impulse circuit to said stepping means of claim 1,
 a count coil in said auxiliary counter,
 a sheet passage switch impulse to auxiliary counter circuit from said sheet passage switch to said count coil of said auxiliary counter, 25
 a set of auxiliary counter normally open switch contacts in said sheet passage switch impulse to auxiliary counter circuit,
 count means in said counter for registering a count actuated by said count coil upon said count coil being impulsed
 said count means registering a pre-set number of impulses and then assuming a counted-out condition,
 an auxiliary counter sequence in said tape having auxiliary counter actuate and non-actuate signals at each step of said tape program,
 an auxiliary switch finger in said programmer reading auxiliary counter signals,
 an auxiliary counter circuit leading from said auxiliary counter feeler finger to said auxiliary counter solenoid,
 said auxiliary counter switch finger upon reading an auxiliary counter actuate signal in said tape changing said auxiliary counter circuit to actuate said relay to change and latch the condition of said normally open and closed contacts whereupon further pulses from said sheet passage switch actuate said counter count coil as each sheet passes into a selected said pocket at said conveyor until said counter assumes its counted out condition,
 and unlatching means in said counter tripped by said counter assuming its counted out condition for unlatching said relay and returning sheet passage switch impulses back to said tape stepping means of said programmer after the pre-set number of sheets has been loaded in a certain selected pocket by said auxiliary counter without stepping said tape.
 10. In a sheet handling mechanism as set forth in claim 7, means for terminating stepping said tape in said programmer, comprising,
 a stop tape relay having a set of normally closed contacts in said sheet passage switch impulse circuit,
 a stop tape switch finger in said programmer,
 a circuit including said relay and said tape switch finger,
 means causing pulses in said circuit, and
 a stop tape sequence in said tape having a stop tape signal ready by said stop switch finger;
 said stop tape switch finger upon reading a stop tape signal in said tape actuating said relay to change condition opening said normally closed contacts in said impulse circuit interrupting impulses to said stepper coil stopping the stepping of said tape.
 11. In a sheet handling mechanism as set forth in claim 7 means for sending said receptacle home without program stepping past unused pockets, comprising a

home pocket on said receptacle such as the pocket number one providing a start and end position in moving said receptacle,

switch tripping means on said receptacle relative said home pocket,

a normally closed home pocket switch stripped by said tripping means when said home pocket is at said conveyor to open said home pocket switch,

a home pocket latching relay having normally open, normally closed switch contacts, and a solenoid actuating said contacts,

a set of said (normally open) contacts in said receptacle drive circuit,

a home circuit including said solenoid and said home pocket switch,

a home switch finger in said programmer,

a relay actuated by said switch finger having contacts in said home circuit,

a receptacle home position sequence in said tape having a homing signal at a selected step position after the desired number of pockets have been programmed as to sheet insertion,

said step reading programmer stepping means advancing said tape one step upon the passage of each sheet into each said pocket with said drive inactive holding each said pocket at said conveyor as sheets pass into each said pocket at each program step having a drum-hold signal on said tape with the number of consecutive drum-hold signals on said tape read by said switch-finger determining the number of sheets sheets passed into each said pocket;

the presence of a move-pocket signal in the program sequence on said tape read by said switch-finger changing said circuit actuating said drive to move said receptacle one pocket to advance the next said pocket to said conveyor;

said program on said tape in said programmer having the sheet-to-pocket delivery step sequence signals and the move-pocket step sequence signals coordinated with each other correlating sheet delivery steps to each said pocket with hold-move steps to each said pocket to effect delivery of the desired number of sheets in each said pocket.

12. In a sheet handling mechanism as set forth in claim 11,

a collator counter including said home latching relay having said normally open and closed contacts and said solenoid actuating said contacts,

said collator counter also having a clutch coil, a count coil, and count means actuated by said count coil, said collator clutch coil being actuated by said switch finger actuated relay to activate said counter,

said counter upon being actuated disconnecting said sheet passage impulse switch circuit from said programmer and connecting it to said counter count coil;

the passage of sheets after said counter is energized pulsing said count coil of said counter activating said count means;

said count means upon counting out disconnecting said collator pocketing circuits and connecting said collator drum home circuit whereupon said receptacle moves to and stops at said home position.

13. The method of effecting immediate controlled distribution of mass communications quickly and accurately allocating and stacking copies of mass inscribed sheets in desired numbers of copies to identified recipients including the steps of:

inscribing the sheets with information,

making a schedule of distribution for the inscribed sheets including the number of copies to each recipient,

designating receiving pockets to recipients according to the distribution schedule,

programming a tape with the schedule of distribution relative to the pockets,

feeding the copies of the sheets one at a time to a sheet insertion point relative to the pockets,

moving the pockets and sheet insertion point relative to one another for inserting sheets one-at-a-time into each pocket,

actuating the relative movement between said pockets and said sheet insertion point, and

controlling the actuating of relative movement by reading said tape program to insert none, one, or more sheets in each pocket selectively.

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